Chapter 13

PDS Objects

The Planetary Data System has designed a set of standard objects to be used for submitting catalog object templates as well as for labeling data products. These standard objects, along with definitions of individual keywords comprising those objects, are defined in the *Planetary Science Data Dictionary*. In addition, object definitions and examples are also included as Appendix A and Appendix B of this document.

13.1 Generic and Specific Data Object Definitions

For each type of data object that PDS has defined (i.e., IMAGE, TABLE, etc.), there are two categories, generic and specific. A generic object is the universal definition of an object, or superset of keywords that can be used. A specific object is a subset used for a specific data product to allow effective use of validation tools.

Generic objects are designed and approved by the Planetary Data System. The elements used to define objects are classified either as Required or Optional. The Required and Optional member elements are explicitly listed while the Optional member elements may include any element in the data dictionary. A Specific object is defined for a particular data product and is based in a selected Generic object. All Required elements and selected Optional elements from the Generic object are used to define the Specific object.

Using the generic object definition as a guide and consulting with a Central Node Data Engineer, a user may then customize the object by first using all the required keywords, and then choosing which optional keywords apply to the data product. In addition, any keywords listed in the *Planetary Science Data Dictionary* can be chosen for special purposes. The resulting object will be a specific object that is subject to approval during a design review.

The following examples illustrate the migration from the generic IMAGE object to a specific IMAGE object and then an instance of that specific IMAGE. Note that when a specific case is used, that usage should be consistent for all labels defining a like data product.

```
OBJECT                                  = GENERIC_OBJECT_DEFINITION
NAME                                    = IMAGE
STATUS_TYPE                             = APPROVED
STATUS_NOTE                             = "V2.1  1991-01-20  MDM  New Data Object Definition"
DESCRIPTION                             =  "An image object is a regular array of sample values.  Image
objects are normally processed with special display tools to produce a visual representation of the sample   values.  This is done
by assigning brightness levels or display   colors to the various sample values. Images are composed of LINES   and SAMPLES.
They may contain multiple bands, in one of several  storage orders.
```

Note: Additional engineering values may be prepended or appended to each LINE of an image, and are stored as concatenated TABLE objects, which must be named LINE_PREFIX and LINE_SUFFIX. IMAGE objects may be associated with other

objects, including HISTOGRAMs, PALETTEs, HISTORY and TABLEs which contain statistics, display parameters, engineering values or other ancillary data."

```
SOURCE_NAME                     = "PDS CN/M.Martin"
REQUIRED_ELEMENT_SET            = {LINE_SAMPLES, LINES, SAMPLE_BITS,
                                   SAMPLE_TYPE}
OPTIONAL_ELEMENT_SET            = {BAND_SEQUENCE, BAND_STORAGE_TYPE,
                                   BANDS, CHECKSUM, DERIVED_MAXIMUM,
                                   DERIVED_MINIMUM, DESCRIPTION,
                                   ENCODING_TYPE, FIRST_LINE,
                                   FIRST_LINE_SAMPLE, INVALID,
                                   LINE_PREFIX_BYTES, LINE_SUFFIX_BYTES, MISSING,
                                   OFFSET, SAMPLE_BIT_MASK, SAMPLING_FACTOR,
                                   SCALING_FACTOR, SOURCE_FILE_NAME,
                                   SOURCE_LINES,  SOURCE_LINE_SAMPLES,
                                   SOURCE_SAMPLE_BITS, STRETCHED_FLAG,
                                   STRETCH_MAXIMUM, STRETCH_MINIMUM, PSDD}
REQUIRED_OBJECT_SET             = “N/A”
OPTIONAL_OBJECT_SET             = “N/A”

OBJECT_CLASSIFICATION_TYPE      = STRUCTURE

OBJECT                          = ALIAS
NAME                            =  “N/A”
USAGE_NOTE                      = “N/A”
END_OBJECT                      =  ALIAS

END_OBJECT                      = GENERIC_OBJECT_DEFINITION
```

This next example illustrates IMAGE object definition being used for a specific case.

```
OBJECT                          = SPECIFIC_OBJECT_DEFINITION
NAME                            = XYZ_IMAGE
STATUS_TYPE                     = APPROVED
STATUS_NOTE                     = "V2.1 1991-02-10  TMA New specific data object definition"
DESCRIPTION                     = "The XYZ image is..."

SOURCE_NAME                     = "PDS CN/M.Martin"
REQUIRED_ELEMENT_SET            = {LINE_SAMPLES, LINES, SAMPLE_BITS,
                                     SAMPLE_TYPE, SAMPLING_FACTOR,
                                     SOURCE_FILE_NAME,
                                     SOURCE_LINES,  SOURCE_LINE_SAMPLES,
                                     SOURCE_SAMPLE_BITS, FIRST_LINE,
                                     FIRST_LINE_SAMPLE}

OBJECT_CLASSIFICATION_TYPE      = STRUCTURE

OBJECT                          = ALIAS
NAME                            = “N/A”
USAGE_NOTE                      = “N/A”
END_OBJECT                      = ALIAS

END_OBJECT                      = SPECIFIC_ OBJECT_DEFINITION
```

13.2 Primitive Objects

Generic objects have a subclass called primitive objects that include ARRAY, COLLECTION, ELEMENT, and BIT_ELEMENT. A primitive object is primarily used as the foundation for defining the elementary structure of PDS objects that have either more abstract or more uncommon layouts than more common structures like TABLES or IMAGEs. For example, a simple camera image abstractly described by a PDS IMAGE object, shown in Example 1, could alternately be described using a 2-dimensional ARRAY object, as shown in Example 2.

Example 1

```
OBJECT          = IMAGE
LINES           = 800
LINE_SAMPLES    = 600
. . .
END_OBJECT      = IMAGE
```

Example 2

```
OBJECT          = ARRAY
AXES            = 2
AXIS_ITEMS      = (800, 600)
AXIS_NAME       = (LINES, LINE_SAMPLES)
                  . . .
END_OBJECT      = ARRAY
```

However, given the PDS objective of defining a robust object model for planetary science data, it is recommended that primitive objects only be used when other PDS objects result in a misleading or incorrect description of the data being labeled.